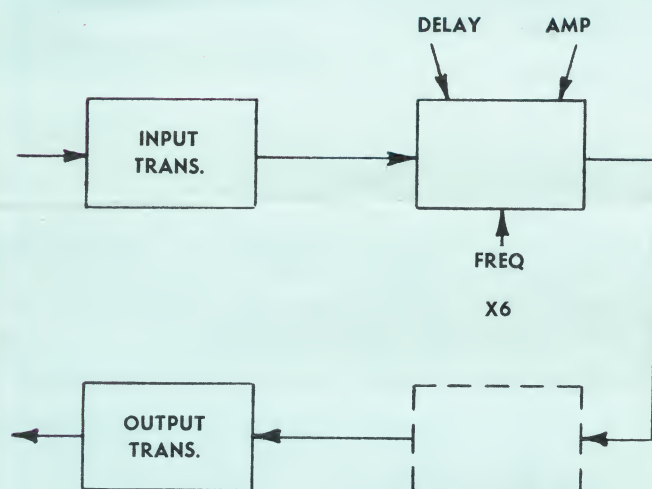


DELAY EQUALIZER 475A



- WIDE RANGE OF DELAY
- DELAY UNITS MAY BE CASCADED
- ALL SOLID STATE
- COMPENSATE FOR BOTH LEVEL AND DELAY
- COMPACT 5 1/4 INCH PACK
- CONTAINS SIX EQUALIZING SECTIONS
- SIMPLE OPERATION
- CONTINUOUSLY ADJUSTABLE

DESCRIPTION

Delay is continuously adjustable from approximately .25 to 2.5 msec. per section at frequencies of 1, 1.4, 1.6, 2.0, 2.4, and 2.8 Kc. Other frequencies available on special

order. The 475A is so designed that any delay section is available at any frequency — that is, the maximum delay at 1.4 Kc, for instance, can be increased by switching more than one delay section to that frequency. In addition, amplitude control is provided to either increase or decrease level at the frequency to which a section is tuned. An option provides up to +40 db of flat gain, with a four step attenuator, to compensate for line losses.

APPLICATIONS

The Model 475A Delay Equalizer may be used on voice and data transmission lines to equalize the delay across a frequency band. Amplitude variations may also be equalized through active variable gain sections in the instrument. In addition, the 475A equalizer has found usage in laboratory work for adding compensation during development of prototype communications equipment.

ACTON

Laboratories, Inc.

A SUBSIDIARY OF BOWMAR INSTRUMENT CORPORATION

531 MAIN STREET • ACTON, MASS. 01720

PRECISION ANGLE POSITIONING DEVICES • PRECISION ELECTRONIC INSTRUMENTATION • PRECISION ROTOFLEX
TELEMETRY COMMUTATORS • INDEPENDENT ENVIRONMENTAL TESTING

ELECTRICAL SPECIFICATIONS**ALL SOLID STATE****DELAY**

Approximately .25 to 2.5 msec. delay at 1, 1.4, 1.6, 2.0, 2.4 or 2.8 Kc. Delay is continuously variable over this range. This delay is achieved with one section. Six sections are provided, and any of the above frequencies is available with any section. Delays may be cascaded in any desired combination.

AMPLITUDE

Nominal gain = 0 DB (40 db with optional amplifier)
Level, 0 DBM
Can be varied approx. ± 3 DB at selected frequencies.

IMPEDANCE

Input and output balanced impedance, $600\Omega \pm 5\%$

INPUT POWER

115V, 50/60 cycles

ALSO AVAILABLE:**TRANSMISSION AND DELAY MEASURING SET
TYPE 451A/452A****DESCRIPTION . . .**

The Type 451-A - 452-A Set measures envelope or phase delay on telephone lines. This set consists of two units, the 451-A transmitter and 452-A receiver.

The transmitter delivers a carrier frequency adjustable from 200 cycles to 12 kilocycles. A motor will continuously sweep the frequency over the range, or the frequency can be adjusted manually. Output is adjustable from -20 to +10 dbm. The measurements of delay, which are on a relative basis, are shown on a meter, registering either 2 or 20 milliseconds full scale. Transmitter and receiver are engineered to match a 600 ohm telephone transmission circuit. Besides measuring envelope delay, this equipment is applicable to loss-frequency testing on telephone facilities. Because of its ability to read delay directly in tenths of milliseconds, the equipment is relatively foolproof, with little likelihood of errors of interpretation of readings.

The Type 451-A - 452-A Delay Measuring Set was designed especially for use on telephone lines, and is not an adaptation of other types of equipment to this application.

MECHANICAL SPECIFICATIONS**SIZE**

5¼" height x 19" width x 12" depth. Standard is 19" rack mounting

WEIGHT

Approximately 15 lbs.

PRINCIPLES OF OPERATION

The 475A contains six transistorized delay modules. The transfer functions of each module can be adjusted so that it has a phase shift which varies with frequency in the manner of a resonant circuit. This phase shift becomes zero at the center frequency to which the unit is tuned, but the rate of change of phase, $\frac{d\theta}{d\omega}$ is a maximum at this point. By means of appropriate summing of the input and output voltages of the delay module, the amplitude variation with frequency can be zero, or a gain or loss of approximately 3 db. can be obtained. By effectively varying the Q of the resonant circuit in the delay module, a wide variation in delay can be achieved.

SPECIFICATIONS . . .

Transmitter Carrier Frequency: Adjustable from 200 cycles to 12 kilocycles, either manually or continuously by a motor.

Output Range: Adjustable from -20 dbm to +10 dbm; an external oscillator may be connected to extend range to 24 kc.

Resistance: Transmitter and receiver designed to match 600-ohm telephone line.

Delay Measurements: 2 milliseconds or 20 milliseconds full scale.

Modulation Frequency: 25 cycles.

Power: 105-125 volts, 60 cycles requiring approximately 1.5 amps.

WRITE FOR COMPLETE DATA SHEET

March 3, 1966
(DATE)

ACTON

Laboratories, Inc.

ACTON LABORATORIES, INC.

531 MAIN STREET, ACTON, MASSACHUSETTS 01720

(A Subsidiary of Bowmar Instrument Corporation)

TEL: 617-263-7756

TWX: 617-263-5404

TECHNICAL DATA TRANSMITTAL SLIP

We are pleased to forward the following technical data:

475A data page

In reply to your recent request for additional information concerning:
delay equalizer

appearing in: **Information Display - Nov.**

For additional specifications, quotations or application assistance, please

contact Mr. **Rudy Cvitan**

Field Engineer, at the address and phone number checked below:

- ☐ 531 Main St., Box 191
Acton, Mass. (CO-3-7756)
- ☐ 241 Crescent St.
Waltham, Mass. (899-0160)
- ☐ 75 Plandome Rd.
Manhasset, L. I., N. Y. (MA-7-8790)
- ☐ 15 Warrington Dr.
Rochester, N. Y. (271-6322)
- ☐ 40 Grove St.
Somerville, N. J. (526-0400)
- ☐ Box 375A
Califon, N. J. (832-2116)
- ☐ 1000 Sixteenth St., N.W.
Washington, D. C. (393-1796)
- ☐ 310 W. Third St.
Burlington, N. C. (226-7177)
- ☐ 2610 Seabreeze Ct.
Orlando, Florida (422-0039)
- ☐ 3305 Patton Rd., Suite 1
Huntsville, Ala. (539-9601)
- ☐ P. O. Box 13577
St. Petersburg, Fla. (347-6183)
- ☐ 1915 Brownsville Rd.,
Pittsburgh, Pa. (881-4545)

- ☐ 15516 Madison Ave.
Cleveland, Ohio (228-1044)
- ☐ 3300 South Dixie Dr.
Dayton, Ohio (AX-9-0212)
- ☐ 3985 Race Rd., Box 11043
Cincinnati, Ohio (662-1616)
- ☐ 8000 Bluffton Rd. - Box 2825
Ft. Wayne, Ind. (747-3121)
- ☐ 20203 Ann Arbor Trail
Dearborn, Mich. (581-5606)
- ☐ 22050 W. McNichols Rd.
Detroit, Mich. (535-0600)
- ☐ 6713 N. Oliphant Ave.
Chicago, Ill. (744-8844)
- ☐ 7256 W. Touhy Ave.
Chicago, Ill. (SP-4-6440)
- ☐ 1595 Selby Ave.
St. Paul, Minn. (646-7371)
- ☐ 7100 France Ave., South
Minneapolis, Minn. (922-2811)
- ☐ 6631 E. Kellogg, Rm. 223
Wichita, Kan. (MU-2-9433)
- ☐ P. O. Box 567
Eules, Tex. (BL-5-2632)

- ☐ 6513 E. Lancaster, Box 8008
Ft. Worth, Tex. (GL-1-6710)
- ☐ 2633 Texas (N.E.)
Albuquerque, N. M. (299-0473)
- ☐ 444 W. Camelback Rd.
Phoenix, Ariz. (279-1231)
- ☐ 4971 Jackson St.
Denver, Colo. (388-4391)
- ☐ 3407 W. Olive St., Suite 210
Burbank, Calif. (843-4545)
- ☐ 275 Castro St., Box 881
Mt. View, Calif. (961-8510)
- ☐ 10211 N.E. 31st Pl.
Bellevue, Wash. (VA-2-9629)
- ☐ 1011 N.E. 69th St.
Seattle, Wash. (LA-4-5170)
- ☐ 4797 Clemenceau St.
Chomedey, Que., Canada (681-5020)
- ☐ 29, Honeybots Rd., Mayford
Woking, Surrey, England (MA-62202)
- ☒ **6 Bayberry Cir. E.**
Liverpool, NY

PRECISION PRODUCTS FOR CONTROL OF THE FUTURE